NGOP Briefing

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Talk Overview

- Evolution of NGOP and its current status
- Scope of deployment
- Product availability
- Status of support

Project Goals

- Provide framework for development of monitoring tools and customizable service-level diagnostics
- Active monitoring
- Problem diagnostics
- Early error detection and problem prevention
- Centralized data collection
- Execution of corrective and notification actions
- Performance analysis

Project Milestones

- Summer 1999 – Winter 2000:
  - NGOP group was created to gather requirements for a Distributed Management System capable of efficiently monitoring Fermilab computing facility for Run II.
  - Decision to develop a custom DMS was made.
- Spring 2000 – Winter 2001:
  - First prototype implementation was released.
- Spring 2001 – Winter 2002:
  - Monitoring by operator was started.
  - “Xfalive” service was replaced with NGOP for all nodes monitored by CSD.
  - Interfacing Remedy Help Desk System.
  - Implementation of Web Admin Tools
- Spring 2002-Winter 2003:
  - Major re-design of NGOP GUI and implementation of Web interface
  - Web Admin Tool was integrated with CD System Status Page
  - NGOP interface to telalert

Essential Requirements (I)

- **Satisfied**
  - Scalable up to thousand hosts
  - Multiple simultaneous users
  - Monitor the hosts with all Fermi supported Unix flavors and Windows 2000/NT
  - Provide the general tools for system and hardware monitoring
  - Provide the hook for user defined monitoring tools
  - Users with different authorization levels, Locking mechanism and mirroring for multiple users
  - GUI/ Web GUI and command line interface with the same capability as GUI
  - Display status of each monitoring object and overall status of the monitoring objects tree
  - Group monitoring objects, handle overlapping clusters
  - Maintain configurable class of services list (e.g. 9x5,24X7) . Able to assign class service to monitoring object
  - Configurable Alarm severity for any monitoring object in the tree (prioritization mechanism)

Essential Requirements (II)

- Provide the way to set and maintain configurable list of "special" node statuses such as known bad,
- off-line, etc."Special" type nodes cause no effect on overall status of monitoring object
- Store/retrieve the historical data
- Smooth start up after power outages
- API to external devices
- Integration with Remedy
- Training and documentation well before going into production

- **Not Satisfied / Partially satisfied**
  - Collection/Analysis of performance data
  - Add/delete/modify monitoring objects without restarting or interrupting current monitoring
  - Wireless hand-held device support

Collaboration efforts

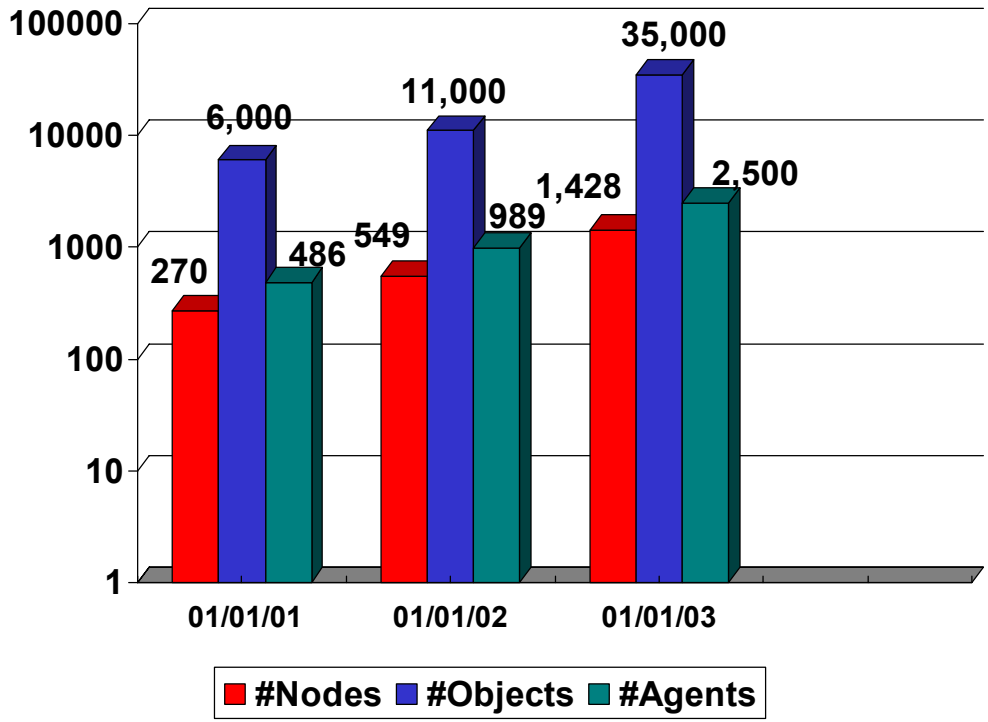
- CERN – started in Spring 2000 (PEM – leader Tim Smith)
  - Discussed the common requirements and computing environment
  - Evaluated two approaches to DMS (NGOP and PEM)
  - Agreed on XML usage
  - Efforts failed but still attempt was beneficial for us
  - Three projects have been started since then at CERN
- IN2P3 Lyon – started in Spring 2001 (Philip Olivero)
  - Did not have man power for full scale development
  - Was eager to use beta-release and tailor to IN2P3 needs
  - Gave up waiting for CERN deliverables
  - Uses NGOP
  - Provides us with very useful feedback
  - Current installation includes:
    - 779 hosts
    - 7 Roles
    - 40 Applications

Team

- Development Team
  - 1999 – Oct, 2001 (4 people , overall effort < 1 FTE)
  - Oct, 2001 – Dec, 2002 (5 people, overall effort < 1.5 FTE)

Name	Effort		Management	Development	Support
	Min	Max			
J. Fromm	10%	25%		Archive Services Plugin Agent on Window Documentations	System Adminstration of NGOP central nodes Archiver Installation/Administration NGOP Database Administration Web pages administration
K. Genser	0%	50%	project manager (9/99 – 4/02)	NGOP Java GUI	
T. Levshina	50%	90%	project leader	NGOP Central Server Status Engine, Status Engine API Locator Server Action Server Monitoring Agent API Plugin Agent Ping Agent Web Admin Agent	NGOP Central Services Administration NGOP Central Configuration Web pages administration Farm agents configuration Version upgrade and installation Configuration upgrade User support
M. Mengel	25%	25%		Configuration File Management Service Swatch Agent URL Agent Web GUI CD System Status page/NGOP integration NGOP script and start/stop mechanism and documentation	System Administration of NGOP central nodes NGOP Central Configuration (Web monitoring) Apache & Fast CGI Installation/ Administration
V. Podstavkov	20%	70%		NGOP Web Admin Tool Web Tool documentation and tutorial	Zope Installation/Administration

Deployment Timeline

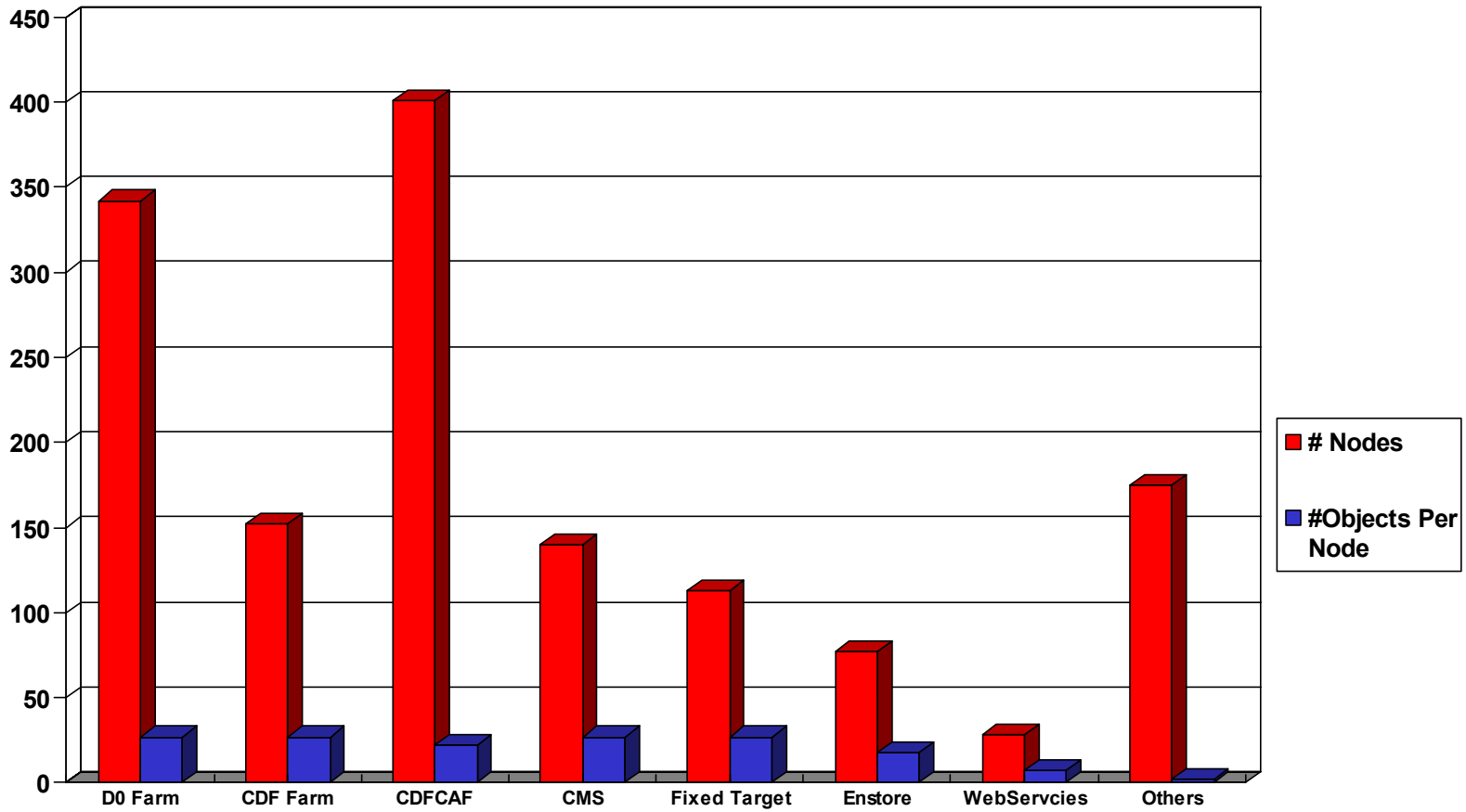


- 01/01/2001
  - DO Farm
  - CDF Farm
  - Fixed Target
- 01/01/2002
  - Enstore
  - CMS
- 01/01/2003
  - CDFCAF
  - Fermilab WEB

Monitored Entities

- OS Health
  - System daemons
  - NFS mounts
  - File System Size
  - Swap, memory utilization
  - Cpu Load (local and remote)
  - Number of users & processes
  - Kernel errors in SYSLOG
- Hardware
  - Node/switch up/down
  - Node reboot
  - Number of processors on line
  - Fan speed
  - Baseboard temperature
  - Disk errors
  - Tape drive errors
- Web Pages
  - Page reachablity
  - Page content
  - AFS volumes availability
  - Error logs
- FBS availability
- Enstore cronjobs for hungs
- Mail & List Servers

Scope of deployment



Implementation Details

- Written primarily in Python (some modules in C, NGOP Monitor in Java)
  - Compatible with python 2.1
  - Java 1.4.0 and higher
  - Python code (~18,000 lines), C code (~ 350 lines), Java (~ 3,000 lines)
- XML (and partially MATHML) for all configuration files
  - Central configuration (~ 8,000 lines)
  - Central Agents (URL, Ping) configuration (~ 8,000 lines)
- Oracle Database for event logging
- MISWEB for event retrieving
- Remedy API, Telalert API

Product Availability

- Current version is v2_1
- NGOP is a Fermitool and is in KITS
- Product availability:
  - Monitoring Agents are available on Linux,Irix,Solaris, and OSF1
    - “PlugIns” Agent was ported to Windows
  - NGOP Central Services, Web Admin Tool run on Linux
  - NGOP Web GUI is available via any Web Browser
  - NGOP Java Monitor runs on Linux, Windows 2000 and Sun

Classes and tutorials

- Provided multiple Web Admin Tool classes
  - One hour class
  - 20 to 25 people attended
- Provided two general overview classes
  - Four hours class
  - 25 people attended
- Provided two advanced classes (XML overview, NGOP configuration language, how to write agents)
  - eight hours class
  - 15 to 20 people attended
- All tutorials are on the web

Support Status

- There are no formal decision about who is responsible for support
- Gentlemen's agreement:
  - CSI group is providing system administration for central nodes (Marc & Jim)
  - MAP group is providing software administration, configuration upgrade and users support
    - Vladimir is responsible for Web Admin Tool
    - I am doing all the rest , Marc is helping with web configuration
- There is no 24by7 support!

Hardware Resources

- NGOP Central nodes
  - ngopsrv – designated to run Central Servers and Agents (NCS, Action, CFMS, Ping Agents, URL Agents)
  - ngopcli – designated to run Status Engines, Web Gui Service, Web Admin Tool
  - ndem – designated to run Web Browser for operator and Ping Agent pinging ngopcli and ngopsrv. It is nstalled in the operator console area.
  - fncdug1 (CSS/DS node): Archiver and Oracle DB
- NGOP test environment:
  - ngop – designated to run all NGOP components, allows users to test their agents and configuration

Needed Support

- NGOP Central nodes (4 nodes)
  - Hardware Support
  - OS Support – patches , kernel upgrades
  - Support of products NGOP depends upon
    - Python
    - Apache/Fast CGI
    - Zope
    - Java
    - CVS
- NGOP Services Support
  - Version release, KITS, installation and upgrade
  - “Watch the watcher” project
  - Configuration administration and upgrade
- User Support and Training

NGOP Services Support
(Mundane Administrative Tasks)

- "Watch the watcher" project: make sure that all the NGOP central services are functioning:
  - agents, servers are running on central nodes
  - all subsystems are working properly
  - investigate reported problems, open bug report if necessary
- Version upgrade:
  - build, place it in KITS
  - notify users
  - shutdown NGOP Services
  - install new version on central nodes
  - restart NGOP Services
  - notify users
- Schedule suppression/restoration of action/ticket generation in case of global problems such as Network maintenance, scheduled power outage

Central Configuration Administration and Upgrade

- Periodic central configuration upgrade (for time being: bi-weekly on Thursday Morning from 8 am to 9 am).
- Get request from users, e.g:
  - add new clusters/nodes for monitoring
  - delete obsolete nodes
  - add/modify/delete system view ,system, monitored element
  - add/modify/delete condition,thresholds action for rules
  - add/modify/delete conditions,threshold, action for
- Manage "centralized" agents (url, ping)
- Modify configuration, test it, re-create indices
- Upgrade procedure
  - notify users
  - partially shutdown NGOP Services
  - notify CFMS about new configuration version
  - restart NGOP Services
  - notify users

User Support

- Answer users questions
- Provide training for new users
- Help users to
  - Write Agents
  - Create/modify configuration
    - Objects Hierarchy
    - Status Rules
  - Install Java GUI, NGOP Agents
  - Setup NGOP environment (ngop start/stop mechanism)

Summary

- A comprehensive framework was created to fulfill monitoring needs of system administrators, operators and end users.
- A structured framework was provided to collect events, alarms and actions.
- NGOP Service had already proven itself in helping to increase the systems uptime and efficiency.
- The comprehensive documentation is provided.
- Creating configuration and rules is quite complicated and time consuming procedure. It requires knowledge of XML and NGOP configuration language. The tools that shield end users from these do not exist.
- Performance data collection and integration with NGOP was not developed. Requirements do not exist.
- Support issues have to be addressed.

More Information can be found at:

URL: http://www-isd.fnal.gov/ngop/

e-mail: ngop-team@fnal.gov

Why not commercial products?

- limited off-shelf functionality
- considerable difficulties with integrating new packages into the framework
- high initial and support cost
- substantial efforts and human resources requirements during the installation and customization
- requirements for additional third-party products in order to gain better scalability and more off-shelf functionality

Some quotes from Data Communication Journal 9/21/99 (by M.Jander "Framework Fraud" pp. 33-42) - Data Comm's survey of net management frameworks that includes evaluation of Tivoli,HP Openview, Unicenter and other products by 1,100 network architects:

"Deficient technology and broken promises"

"Two years to get a system up and running"

"We need a Ph.D. in physics get it [the product] working"

"for each dollar of framework purchases, a customer pays $3 in after-sales services"

NGOP Architecture